

### New York State Department of Health Center for Environmental Health

### **Health Consultation**

# FORMER ZONOLITE COMPANY/ W.R. GRACE EXFOLIATING PLANT

## TOWN OF BRUTUS, CAYUGA COUNTY NEW YORK

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### Foreword: ATSDR's National Asbestos Exposure Review

Vermiculite was mined and processed in Libby, Montana, from the early 1920s until 1990. We now know that this vermiculite, which was shipped to many locations around the U.S. for processing, contained asbestos.

The National Asbestos Exposure Review (NAER) is a project of the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is working with other federal, state, and local environmental and public health agencies to evaluate public health impacts at sites that processed Libby vermiculite.

The evaluations focus on the processing sites and on human health effects that might be associated with possible past or current exposures. They do not consider commercial or consumer use of the products of these facilities.

The sites that processed Libby vermiculite will be evaluated by (1) identifying ways people could have been exposed to asbestos in the past and ways that people could be exposed now and (2) determining whether the exposures represent a public health hazard. ATSDR will use the information gained from the site-specific investigations to recommend further public health actions as needed. Site evaluations are progressing in two phases:

Phase 1: ATSDR has selected 28 sites for the first phase of reviews on the basis of the following criteria:

- The U.S. Environmental Protection Agency (EPA) mandated further action at the site based upon contamination in place, or
- The site was an exfoliation facility that processed more than 100,000 tons of vermiculite ore from Libby mine. Exfoliation, a processing method in which ore is heated and "popped," is expected to have released more asbestos than other processing methods.

The former Zonolite Co./ W.R. Grace exfoliating facility site in Brutus, New York was selected for Phase 1 review as estimates suggest the facility imported 148,485 tons of Libby vermiculite during operation.

The following document is one of the site-specific health consultations ATSDR and its state health partners are developing for each of the 28 Phase 1 sites. A future report will summarize findings at the Phase 1 sites and include recommendations for evaluating the more than 200 remaining sites nationwide that received Libby vermiculite.

Phase 2: ATSDR will continue to evaluate former Libby vermiculite processing sites in accordance with the findings and recommendations contained in the summary report. ATSDR will also identify further actions as necessary to protect public health.

### BACKGROUND AND STATEMENT OF ISSUES

The New York State Department of Health (NYS DOH) prepared this health consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). The objectives of this document are to summarize the information known about the former Zonolite Co./ W.R. Grace site in Brutus, New York, and to evaluate the public health implications of any potential past, present, or future pathways of human exposure to Libby asbestos.

### A. Site Description and History

The former Zonolite Co./ W.R. Grace facility was on a 1.6-acre plot of land on Dunn Road in the town of Brutus, New York. Homes and a farm border the property to the north, a railroad line to the south, a NYS Thruway entrance/exit ramp to the west, and undeveloped property to the east (US EPA, 2002a). The Village of Weedsport, the closest village, lies approximately 0.25 miles southwest. The facility was commonly known as and will be referred to in this document as the Weedsport facility. The general area is of mixed land use, including agricultural, undeveloped, and residential properties (Appendix A).

The site was formerly owned by the Lehigh Valley Railroad Company and was transferred to a private owner in 1955 (EPA 2002a). In 1963, two buildings and four silos were erected on the site. From 1963 through 1989, Zonolite Co./ W.R. Grace Corporation leased the property and used the buildings for processing vermiculite (EPA 2002a).

Vermiculite mined by W.R. Grace in Libby, Montana contained naturally occurring asbestos fibers, including the amphibole asbestos varieties tremolite and actinolite, as well as the related fibrous asbestiform minerals winchite, richterite and ferro-edenite (USGS 2002). Amphibole asbestos fibers are friable (breakable) and can become airborne. Amphibole asbestos is not generally broken down and can remain in the environment for long periods of time (ATSDR 2001a). The characteristic composition of asbestos contaminating the Libby vermiculite is referred to here as *Libby asbestos*. In this document, soil sample results reported as "tremolite asbestos" or "tremolite-actinolite" indicate the presence of Libby asbestos.

In Libby, the vermiculite ore was processed to remove waste rock, segregated by size, and then shipped to exfoliating plants. The Weedsport plant received most of its processed vermiculite ore, known as concentrate, from Libby. The plant heated the vermiculite concentrate, causing the material to expand. This expansion process, called *exfoliation*, created a material with diverse uses.

Vermiculite is used in products for domestic and industrial applications, including construction materials, potting soil, insulation, fireproofing materials, and friction products (TVA 2002).

The processing conducted in Libby reduced the amount of asbestos in the ore, or "concentrate," but did not eliminate it. Estimates of asbestos concentrations in the Libby concentrate vary. In 1982, the Midwest Research Institute (MRI) determined that the concentrate contained 0.3% to 7% tremolite-actinolite by weight (MRI 1982). A 1984 study conducted by W.R. Grace determined that the Libby concentrate contained 0.4% to 1.0% tremolite-actinolite (US DHHS 2001). The difference in estimates may be due to lack of sample homogeneity and analytical differences. The NYS DOH used the largest range reported, 0.3% to 7% tremolite-actinolite, to evaluate the pubic health implications of the site.

In 1989, W.R. Grace terminated operations at the Weedsport site. Following closure, the four silos were removed, but the processing building was cleaned and left intact (EPA 2002a). W.R. Grace had a consultant collect four air samples within the processing building and a silo to verify that the on-site structures were clean in June 1989. The air sample results were below the Occupational Safety and Health Administration's (OSHA) action level of 0.1 fiber per cubic centimeter (f/cc) for an 8-hour time weighted average (TWA). In addition, all measured concentrations were below 0.004 f/cc, which was the minimum amount of fibers that the laboratory could detect and document (Marriam 2003). W.R. Grace gave the results to the property owner in 1992.

In June 2001, the US Environmental Protection Agency (EPA), Region 2, conducted soil sampling in Brutus at the former Zonolite Co./ W.R. Grace site and neighboring properties as part of a national evaluation of facilities that received vermiculite ore from Libby, Montana. Three of the sixty samples collected contained concentrations of tremolite-actinolite asbestos greater than 1% by weight (EPA 2002b). The remaining samples contained concentrations of tremolite-actinolite asbestos ranging from non-detect to 0.75% by weight.

The current owner and operator of the site is Crossroads Industrial Park, Inc. In the recent past, the main building was leased to a company that produced mulch from cocoa husks. The company left the site in 2001 (EPA 2002a). The site is currently unoccupied and available for lease/sale.

### **B.** Demographics

The NYS DOH used data from the 1970 US Census to assess past potential exposures. Demographic data from 1970 was used to represent the community that existed during exfoliating operations before the facility implemented several dust suppression technologies. To evaluate past potential exposures, this report uses two populations: residents within one-mile of the site (Table 1.0) *and* the entire Village of Weedsport.

The NYS DOH used the one-mile radius in identifying the population that lived near the former exfoliating plant in accordance to the health statistics review, which is currently underway (NYS DOH 2002a.).

Table 1.0

1970 Demographic Statistics		
Within One-Mile of Zonolite Co./ W.R. Grace Weedsport Site*		
Total Population	1277	
Race:		
Percent of Population White	99	
Percent of Population Black	1	
Age:		
Percent of Population under 18	38	
Percent of Population 62 years and over	15	
Total Housing Units	412	

<sup>\*</sup>Data collected from the US Bureau of the Census, 1970 Census of Housing: Block Statistics for Selected Areas in New York. 1972.

The following table (Table 1.1) presents the demographic data for the Village of Weedsport:

**Table 1.1** 

1970 Demographic Statistics		
Village of Weedsport**		
Total Population	1900	
Race:		
Percent of Population White	99	
Percent of Population Black and other Race	<1	
Age:		
Median Age	28.8	
Percent of Population under 18	39	
Percent of Population over 65	12	
Total Housing Units	579	

<sup>\*\*</sup>Data collected from the US Bureau of the Census, 1970 Characteristics of the Population: New York Part 34, Section 1. 1970.

The NYS DOH used data from the 1990 US Census to characterize the population living near the former Zonolite Co./ W.R. Grace site after exfoliating operations terminated. A one-mile radius was used to define this population (Table 1.2). The demographic data are presented in the following table.

Table 1.2

1990 Demographic Statistics		
Within One-Mile of Former Zonolite Co./ W.R. Grace Weedsport Site***		
Total Population	1267	
Race:		
Percent of Population White	98	
Percent of Population Asian or Pacific Islander	1	
Percent of Population of Other Race	1	
Age:		
Percent of Population under 19	30.6	
Percent of Population over 65	13.3	
Total Housing Units	465	

<sup>\*\*\*</sup>Results from MapInfo Query using US Bureau of the Census, 1990 Census Block Data: New York.

The population within one-mile of the former W.R. Grace facility from 1970 to 1990 did not change significantly in terms of number of people, age distribution, or ethnicity.

### C. Former Zonolite Co./ W.R. Grace Exfoliation Operations

The Zonolite Co./ W.R. Grace facility in Brutus operated 24-hours a day, five days a week. The on-site exfoliating operations were primarily enclosed. The vermiculite concentrate was brought to the site in 100-ton hopper ore cars via Zonolite's rail line. The site contained a rail siding or spur allowing ore cars to enter the site from the main railroad line, which was formerly owned by Lehigh Valley Railroad Company but currently owned by Conrail. According to data presented in Appendix B, the total tons of vermiculite concentrate received at the Weedsport facility from the Libby mine, with the exception of imports from 1981 for which data are unavailable, were 77,185 tons (EPA 2002b). The US EPA conducted a rough evaluation of shipping records from Libby invoices and estimated that the Weedsport facility imported 148,485 tons of vermiculite concentrate (EPA 2001). The larger estimate is based on a more complete compilation of records, which the EPA expects to be more accurate.

The operation unloaded approximately one 100-ton hopper car per week. The vermiculite concentrate was unloaded onto an enclosed screw conveyor. The conveyor moved the material to a bucket elevator, which transferred the vermiculite concentrate into four enclosed silos. The facility had four emission points regulated by the New York State Department of Environmental Conservation (NYS DEC). The first of these points was the vermiculite concentrate unloading and storage area.

A series of enclosed conveyors transferred the vermiculite concentrate from the silos to the feed hopper. The conveyor drop points vented to a high capacity air pollution control system, known as the cyclone, which was the second emission point (NYS DEC Files, 1970-1989).

The vermiculite concentrate then moved into the expanding furnace at a rate of 2,000 pounds per hour (lbs./hr). The emissions generated from the furnace depended on the exfoliating process. There were two types of processes used at the facility. The first method involved heating the material until water trapped in the vermiculite concentrate boiled, causing the vermiculite to expand. The second method involved the same heating and expansion process with the application of an asphalt emulsion, which was sprayed on the hot vermiculite. The second method waterproofed the expanded vermiculite and accounted for about 30% of the product output (NYS DEC Files, 1970-1989). The asphalt emulsion produced a light smoke and an odor. In 1970, the plant temporarily replaced its asphalt emulsion process with a silicone spray to reduce odors. The furnace was vented to the cyclone and was the third regulated emission point.

Some of the vermiculite was transferred from the furnace to a mixer, which added gypsum and dupinol (an anti-condensation liquid) to the vermiculite to fireproof the product. This process vented to the cyclone and was the final regulated emission point. The vermiculite then dropped from the furnace/mixer into a product elevator that moved the vermiculite over an inclined vibrating screen to eliminate unexpanded materials referred to as "stoner rock" from the product (NYS DEC Files, 1970-1989). A detailed diagram of the facility's processes is in Appendix C.

Dust emissions from the conveyer drop points, furnace, and mixer were reduced by venting them first to the cyclone and then to a wet scrubber, which was installed prior to 1967. The facility periodically operated without the wet scrubber in use. The NYS DOH could not find information regarding the disposal of liquid waste produced from the wet scrubber. In 1973, Zonolite Co./ W.R. Grace replaced the wet scrubber with a different air pollution control device called a "bag house" in accordance with Clean Air legislation. The bag house was installed to reduce odor and dust emissions. The various dust emission controls used were not designed specifically to eliminate asbestos emissions. The facility was not considered an asbestos processor and did not have to comply with air emission regulations for the asbestos industry.

Most of the Libby asbestos in the concentrate was lost during processing and became part of the waste known as "stoner rock." According to mineral analyses conducted by W.R. Grace, the stoner rock contained between 2% to 10% tremolite asbestos (MDH 2001). Until the 1970's, stoner rock was considered non-hazardous.

Waste materials from the facility were disposed in the Seneca Meadows Landfill in Seneca Falls, Seneca County; at an unknown private landfill in Port Byron, Cayuga County; and possibly at several on-site locations (EPA 2002a). A document provided voluntarily by Remedium Group, Inc. a subsidiary of W.R. Grace described waste handling and disposal operations conducted at the private landfill in Port Byron (Marriam

2003). This document states that stoner rock and other waste materials from the cyclone and baghouse were bagged on-site. The bags of waste were then piled onto a truck, covered, and dumped into the Port Byron landfill. The bags may have been leveled by a compactor operator, which would have generated dust (Marriam 2003). The leveled waste may also been covered with other material. According to a former Zonolite Co./W.R. Grace employee, waste was also often stored in piles and bulldozed on-site. Whether the bulldozed material was buried or covered with "clean" soil remains unknown. In addition, records indicate that vermiculite waste materials were used on two private properties in the Port Byron area.

Once separated from the waste, the vermiculite product went directly to bagging machines that placed the product in bags of various capacities. The bagging process was an unregulated source of dust emissions, which discharged directly outside the south building wall. In 1973, the bag spout was vented to the bag house to reduce emissions. The vermiculite product may have contained small amounts of residual Libby asbestos ranging from 0.5%-3% (EPA 2000a.).

### **D. Site Visit: Current Status**

Representatives from the NYS DOH, the Cayuga County Department of Health, the EPA, and ATSDR met in September 2002 at the former Zonolite Co./ W.R. Grace site in Brutus. Participants took photographs of the site during the visit (Appendix D). The participants made the following observations:

- The site was enclosed with a fence to limit entry. The fence varied in height and structure and in some locations may not be a significant deterrent to trespassers.
- The former processing building was present.
- The site was covered with thick vegetation, which was not mowed or maintained.
- The site was for lease/sale by the owner.
- The area surrounding the site consisted of mixed land use including a strip of houses to the north and southeast, forested properties to the northeast and south, and farmland to the northwest (NYS DOH 2002b.).

### E. Health Outcome Data

The NYS DOH Bureau of Environmental & Occupational Epidemiology, in cooperation with the ATSDR Division of Health Studies, is conducting a health statistic review of the population living in the Village of Weedsport and the remaining residents within onemile of the site. The health statistics review is a method of comparing rates of specific adverse health outcomes in this community with national or statewide rates to evaluate whether any unusual patterns in the rates of these health outcomes exist (NYS DOH 2002a.). Cancer incidence data are being evaluated for the years 1986 to 1995 and mortality data are being reviewed for the years 1979 to 1998. ATSDR will release annual reports summarizing health statistics review findings for selected sites for which data have been received. The first report will be released by the end of the year 2003.

The health outcomes reviewed include incidence of cancers related to asbestos exposure and mortality for asbestos related diseases of the respiratory system and asbestos related cancers (NYS DOH, 2002a.). The health statistics review will evaluate whether residents living near the former exfoliating site have elevated rates of asbestos related diseases. The health statistics review cannot prove a causal relationship between potential exposure and health outcomes, but it may indicate whether additional studies are needed.

### **DISCUSSION**

### A. Environmental Sampling Data

In June 2001, the EPA collected surface and subsurface soil samples at the former Zonolite Co./ W.R. Grace site and from nearby residential properties. Before sampling, researchers established a grid on-site with 100 feet (ft) by 100 ft squares. Surface soil samples were collected at 37 nodes of the sampling grid (EPA 2002b). Additional surface and subsurface soil samples were collected in expected areas of contamination on-site, at off-site residential locations, and within a wooded area east of the site. The EPA observed three small areas containing visible asbestos fibers during sampling. These areas were sampled for further analysis. In addition, the EPA identified and sampled five areas on-site containing visual evidence of exfoliated vermiculite (EPA 2002b). A total of 54 samples were collected and analyzed for asbestos including 50 surface soil samples and four subsurface soil samples.

The samples were analyzed using Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM). The TEM method has higher magnification and greater sensitivity, allowing the detection and characterization of smaller fibers. The PLM method analyzes a larger portion of the sample than the TEM method. A detailed description of the types of asbestos, laboratory methods of analysis, and health implications is included in the Appendix E.

The majority of surface soil samples collected on-site contained trace amounts of asbestos too small to quantify (<0.25% asbestos) according to the PLM analytical results. Of the 50 surface soil samples analyzed by PLM, two samples contained >1% asbestos, three samples contained between 0.25% and 1%, 29 samples contained concentrations below the analytical detection limit (>0.25%), and 16 samples did not contain detectable levels of asbestos (EPA 2002b). Of the four subsurface samples analyzed by PLM, one sample contained >1% asbestos, two samples contained between 0.25% and 1%, and one sample result was below the analytical detection limit (>0.25%) (EPA 2002b). Consequently, low-levels of asbestos were detected over a large portion of the property. Asbestos fibers were generally not detected in soil collected from the northern perimeter of the site near Dunn Road.

The Asbestos Hazard Emergency Response Act (AHERA) classifies any mineral containing >1% asbestos, by weight, as an Asbestos Containing Material (ACM) (Addison, 1994). AHERA adopted this percentage in the early 1980's, when laboratory

and analytical methods limited asbestos fiber quantification and identification. (This percentage was not based on health risks.)

Three of the soil samples contained levels of asbestos >1%. These samples were collected from the following locations (See Appendix F):

- surface soil between the inactive railroad tracks and the north side of the former processing building near the hopper car unloading area
- surface soil from the east end of the inactive railroad tracks
- subsurface soil from the woods directly east of the site (EPA 2002b)

The surface soil sample collected between the inactive railroad tracks and the former processing building contained 3.35% asbestos, the highest concentration measured. This area of asbestos contamination is most likely associated with former vermiculite concentrate unloading activities (EPA 2002b). The limited number of samples containing >1% asbestos suggests only isolated areas of higher contamination.

Seventeen soil samples including 13 surface and four subsurface samples were analyzed for fiber length distribution. Of the 17 soil samples, 15 of the samples contained fibers  $>5\mu m$  (EPA 2002b).

Four surface soil samples were collected from nearby residential properties. One surface soil sample contained trace amounts of asbestos too small to quantify (<0.25% asbestos). The remaining three samples did not contain detectable levels of asbestos (EPA 2002b). The limited residential soil data do not suggest that there is significant Libby asbestos contamination off-site.

In September 2002, the EPA conducted a visual site investigation at the two off-site private properties in Port Byron that contain vermiculite waste. The waste was used on two local knolls and as fill in a gully. The EPA returned to these two private properties in September 2003 and collected samples within the areas of vermiculite waste disposal. The samples were analyzed for asbestos fibers and results are pending.

### **B.** Exposure Pathways

An exposure pathway consists of five elements: a source of contamination, a transport mechanism, a point of exposure, a route of exposure, and a receptor population (that is, the people who actually come into contact with the substance). All five of these elements must be present for an exposure to a contaminant such as asbestos to occur. During the 26-years of exfoliating operation, there were several potential pathways of concern. The potential for current and future exposures has been greatly reduced since the time the plant was active. A general table containing potential exposure pathways was developed by ATSDR to include in all health consultations developed for facilities that processed vermiculite from the W.R. Grace Libby mine. The table is included in the Appendix G.

The pathways of exposure most relevant to this site, based on the type of operations, practices that occurred, and the environmental sampling are examined in this section. The pathways are divided into the following groups: *Occupational, Household Contacts, Community*, and *Consumer Products*. In addition, the various potential pathways are subdivided within each group and listed in the order of likely importance.

### **Occupational**

- 1. Inhalation of Libby asbestos fibers by former employees of the Zonolite Co./ W.R. Grace exfoliating facility in Brutus.
- 2. Inhalation of Libby asbestos fibers by former employees of the landfills that received Zonolite Co./ W.R. Grace stoner rock and other waste materials.
- 3. Past and future inhalation of residual Libby asbestos contamination in the former processing building.

### Household Contacts

- 4. Past inhalation by household contacts of Libby asbestos fibers that left the site on former Zonolite Co./ W.R. employee clothing, skin, and hair.
- 5. Past inhalation by household contacts of Libby asbestos fibers that left the site on the former employees of the landfills that received stoner rock and other waste materials from Zonolite Co./W.R. Grace.
- 6. Past inhalation by household contacts of Libby asbestos fibers that left the site on former employees of the mulch company.

### **Community**

- 7. Past inhalation of Libby asbestos fibers from dust emissions (i.e. stack and other emissions) transported off-site.
- 8. Past, present, and future inhalation of Libby asbestos fibers from the disposal of vermiculite waste on residential properties.
- 9. Past inhalation of Libby asbestos fibers from storage piles of waste rock material.
- 10. Past, present, and future inhalation of Libby asbestos by residents near the Seneca Falls and the Port Byron landfills that disposed Zonolite Co./ W.R. Grace stoner rock and other waste materials.
- 11. Past and present inhalation of Libby asbestos fibers from on-site areas of soil contamination.
- 12. Future inhalation to on-site Libby asbestos from disturbance of contaminated soil as land use changes.

### Consumer Products

13. Past, present and future inhalation to Libby asbestos from the handling or disturbance of asbestos-containing insulation or other products.

### **Occupational**

1. Inhalation of Libby asbestos fibers by former employees of the Zonolite Co./ W.R. Grace exfoliating facility in Brutus.

Past employees have stated that dust associated with their jobs was considerable (EPA 2000b). Employee responsibilities at the plant included shoveling vermiculite ore, cleaning the silos and working with the finished product and waste materials. The NYS DOH obtained air sample results from sampling events conducted at the Weedsport facility in 1976, 1982, 1986, 1987 and 1988. Employees wore personal air samplers, and additional air samplers were dispersed at several locations in the plant. The samples were analyzed for asbestos fibers. The laboratory reports suggest that phase contrast microscopy (PCM) was used to analyze the samples. In 1976 and 1982, the analytical results of the personal samplers were consistently less than 2 fibers per cubic centimeter (f/cc), which was the occupational standard at the time (W.R. Grace 1976, 1982). In 1976, a total of thirteen personal air samples were collected from employees. Approximately 92% of the sample results were below the 1976 occupational standard but exceeded the current standard of 0.1 f/cc established in 1994 (OSHA 1994). The remaining 8% of the samples were below 0.1 f/cc (W.R. Grace 1976, 1982). In 1982, sixty-one personal air samples were collected from employees at the Weedsport facility. Approximately 85% of the sample results were below the 1982 occupational standard but exceed the current standard, 7% equaled 0.1 f/cc and the remaining 8% were below the current standard (W.R. Grace, 1976, 1982). It must be noted that the sample analytical forms from 1976 and 1982 do not specify the source of vermiculite processed at the time of sampling, but it was likely from Libby. In 1986, 1987, and 1988, the personal air samples collected were all below 0.1 f/cc (Marriam 2003). The sample analytical forms from the three later years specify that Libby concentrate was processed during the sampling events.

Four personal air samples were collected in 1980 from two W.R. Grace employees responsible for disposal operations. Two samples were collected simultaneously while an employee covered waste materials loaded in a truck, drove to a Port Byron landfill, and dumped the waste in the landfill. The sample results averaged 0.27 f/cc for 43-minute samples (Marriam 2003). Two additional samples were collected from another employee who assisted in covering the waste material in the truck and sat passenger on the way to the landfill. The sample results averaged 0.04 f/cc for 43-minute samples (Marriam 2003). The sample analytical form from the 1980 sample event did not specify the source of vermiculite waste, however it was likely associated with Libby concentrate. In 1983, another personal air sample was collected during hauling and disposal operations of vermiculite waste from an unspecified source. The sample result was 0.26 f/cc. for a 69-minute sample (Marriam 2003). The sample results provide evidence of exposure.

Samples collected in 1986, 1987, and 1988 from areas in the facility including near the vibrating screen that removed stoner rock from the product, within a silo and near the bag house consistently contained results that exceeded the current standard of 0.1 f/cc. For example, in 1986 five out of the seven indoor air samples collected were equal to or

exceeded 0.1 f/cc (Marriam 2003). The maximum amount of fibers detected was 1.14 f/cc from within the silo in 1987.

The asbestos concentrations measured from personal samplers and within the facility provide an indication of potential health risks associated with working at the facility. No fiber identification data were available to draw a linkage between the asbestos fibers detected in the air samples and Libby asbestos. However, the asbestos detected was likely associated with Libby concentrate since large amounts of the concentrate processed at the Weedsport facility was from Libby and since many other sources of vermiculite mined in the United States are not known to contain asbestos (The Schundler Co., 2003). Former employees at this facility were likely exposed to Libby asbestos at levels exceeding the current workplace standard.

2. Inhalation of Libby asbestos fibers by former employees of the landfills that received Zonolite Co./ W.R. Grace stoner rock and other waste materials.

Employees at the landfills that received stoner rock and other waste materials from the Zonolite Co./ W.R. Grace facility were likely exposed to Libby asbestos during disposal and leveling activities. The result for a personal air sample collected in 1983 from a compactor operator at a landfill that received vermiculite waste from another W.R. Grace exfoliating facility other than the Weedsport facility was 0.26 f/cc asbestos for a 24-minute sample. The sample was collected from an employee within the enclosed cab compartment during vermiculite waste leveling activities. The sample result provides evidence of exposure for a short period of time (Marriam 2003). The exposures could vary significantly between landfills depending on the quantity of waste handled and on the disposal practices used. If the measured exposure lasted for an extended period of time in a given day, employees at the landfill may have been exposed to asbestos exceeding the current workplace standard of 0.1 f/cc.

3. Past and future inhalation of residual Libby asbestos contamination in the former processing building.

Zonolite Co./W.R. Grace cleaned the former exfoliating building following closure and conducted an industrial hygiene evaluation in 1989 to confirm that on-site structures were clean. Grace personnel collected four air samples inside the facility and one sample outside the facility. The samples collected were not aggressive, meaning that dust was not intentionally disturbed. All measured concentrations were below the detection limit of 0.004 f/cc (Marriam 2003). The results are well below the current occupational standard of 0.1 f/cc.

Workers at the mulching company may have experienced minimal exposures to residual Libby asbestos. However, residual asbestos fibers did not likely present a significant exposure to the employees.

The on-site building is currently vacant, but may be utilized in the future.

### Household Contacts

4. Past inhalation by household contacts of Libby asbestos fibers that left the site on former Zonolite Co./W.R. employee clothing, skin, and hair.

Former employees may have transported Libby asbestos fibers on their clothing, skin, and hair to their vehicles and homes, potentially exposing their families to asbestos. Several studies have associated household contact exposure with the development of asbestos-related diseases among family members of workers exposed to asbestos on the job (NIOSH 1997).

The risks associated with household contact exposure depend on the extent of employee contact with contaminated dust (i.e. take-home levels of Libby asbestos) and personal hygiene habits such as removing work shoes at the door, changing out of work clothes, and showering promptly after work. Since employees of the Zonolite Co./ W.R. Grace facility were likely exposed to levels of Libby asbestos that exceeded current workplace standards, their household contacts were also likely exposed although the frequency and concentration of exposure are unknown.

5. Past inhalation by household contacts of Libby asbestos fibers that left the site on the former employees of the landfills that received stoner rock and other waste materials from Zonolite Co./W.R. Grace.

Exposures to Libby asbestos may have occurred to household contacts of former landfill workers. Former employees may have transported Libby asbestos fibers on their clothing, skin, and hair to their cars and homes, exposing household contacts. Employee contact time with the waste material was likely indirect (i.e. compactor machines) and infrequent (i.e. occurred during limited hours during the day and limited days during the week). Household contacts may have periodically been exposed to Libby asbestos.

6. Past inhalation by household contacts of Libby asbestos fibers that left the site on former employees of the mulch company.

Since aggressive sampling did not occur in the former processing building, we can not rule out that employees of the mulching company may have been exposed to low level residual Libby asbestos contamination and transported Libby asbestos fibers to their cars and homes. Exposures of household contacts, if any, were likely infrequent and of low concentrations.

### **Community**

7. Past inhalation of Libby asbestos fibers from dust emissions (i.e. stack and other emissions) transported off-site.

Considerable time elapsed between the first community complaint of dust emissions from the former exfoliating facility in 1964 and the implementation of successful industrial controls in the 1973 (NYS DEC Files, 1970-1989). There are reports of dust settling on clothes hanging on outdoor lines, collecting in backyard pools and coating local

vegetation (NYS DEC Files, 1970-1989). In 1973, Zonolite Co./ W.R. Grace replaced the wet scrubber with a bag house. The plant modifications implemented in 1973 helped reduce off-site emissions, but did not eliminate them. Moreover, modifications did not reduce dust emissions from vermiculite unloading activities and other processes at the plant.

In 1968 and 1970, stack tests were conducted at the facility. The results of these stack tests quantified total particulate emissions from the stack during the sampling events, but did not differentiate between non-asbestos particulates and asbestos fibers. Results from the 1968 stack test, projected an emission rate of 120 grams of the particulate matter per hour at maximum processing capacity. According to the 1970 stack tests, 6.01 lbs. particulate matter were released per hour at maximum processing capacity (Marriam 2003). Several limitations impact the interpretation of these emission rates, including lack of documentation for sample collection methods, field and operational conditions, and laboratory analytical methods. Nevertheless, the results indicate particulate matter was released from the facility and likely contained asbestos fibers.

The extent of asbestos transport depended on a number of parameters including wind speed and direction. The prevailing winds are out of the west as displayed by the wind rose in Appendix H. In 1970, approximately 70 people lived within one-mile to the east of the facility. The former exfoliating facility was approximately 150-feet from the closest residential property boundary. The nonresidential areas surrounding the plant created a spatial buffer between the facility and the community.

Libby asbestos may have entered homes through open windows, on clothing and on pets, where it would have settled on household surfaces. Activities such as sweeping or vacuuming could have re-suspended the asbestos fibers. Household dust may have served as a continuing source of asbestos exposure. The degree of exposure to Libby asbestos in the community would have depended on a number of domestic factors. For example, mopping a floor instead of sweeping could have reduced the re-suspension of fibers in the air. There is not enough information to quantify potential exposures to Libby asbestos at the homes surrounding the site. Recent sampling of residential soil did not show evidence of significant off-site transport.

8. Past, present and future inhalation of Libby asbestos fibers from the disposal of vermiculite waste on residential properties.

Vermiculite waste material was disposed on two local private properties. The waste was used on two local knolls which are actively farmed and as fill in a gully. Transporting and distributing the waste on the properties may have led to a suspension of Libby asbestos fibers and an inhalation exposure. The individuals in direct contact with the material were at the highest risk for exposure. The duration of contact and the concentration of asbestos in the vermiculite waste would have determined the extent of exposure.

The EPA collected samples from the disposal areas on the two private properties in September 2003. The sample results were not available at the time this health consultation was released. Nevertheless, the waste on the two properties is generally covered with vegetation and public access is restricted. Soil preparation activities, such as plowing and tilling, conducted on the farmed property may lead to suspension of asbestos fibers. This potential exposure pathway occurs infrequently as tilling operations are typically infrequent, the soil is general covered with vegetation, and the vermiculite waste material is likely mixed with the soil from years of tilling. These areas are not considered a current risk to the community. Land use changes could result in potential future exposures if asbestos concentrations are present. This pathway will be reevaluated as data become available. There are no other documented accounts of stoner rock and related waste material distribution to the community.

9. Past inhalation of Libby asbestos fibers from storage piles of waste rock material.

An anecdotal account alleged that stoner rock waste material was stored in waste piles and frequently bulldozed on-site. The temporary storage of stoner rock waste material in piles on-site was a common practice at exfoliating plants. These piles may have been accessible to neighborhood children. Prolonged contact with the stoner rock may have resulted in exposure. However, there are no documented accounts of such activity and contact with potential on-site waste materials was likely infrequent.

Trespassers, former employees and neighborhood pets that entered the site may have tracked asbestos off-site. Wind could have blown asbestos from uncovered piles of stoner material to nearby properties. However, recent sampling of residential soil did not show evidence of significant off-site transport. Community exposure to Libby asbestos associated with this pathway were likely minimal.

10. Past, present and future inhalation of Libby asbestos by residents near the Seneca Falls and the Port Byron landfills that disposed Zonolite Co./W.R. Grace stoner rock and other waste materials.

Individuals near the Seneca Falls Landfill and the unknown landfill in Port Byron that received Zonolite Co./ W.R. Grace waste may have been exposed to Libby asbestos in disposal related dust. The amount of dust generated would have depended heavily on disposal and landfill characteristics, including if the disposal occurred in a pit or on a hill, and depended on waste leveling and containment practices. In addition, the likelihood of past exposure resulting from disposal operations would have depended on the distance between the landfills and occupied houses or buildings. The NYS DOH received minimal information regarding off-site disposal operations.

Current and future exposure to Zonolite Co./ W.R. Grace waste materials from the landfills are improbable as waste material is covered and contained.

11. Past and present inhalation of Libby asbestos fibers from on-site areas of soil contamination.

Three soil samples collected on-site during the June 2001 US EPA soil sampling event contained levels of asbestos greater than 1% (EPA 2002b). The highest concentration of asbestos was found in a surface soil sample containing 3.35% asbestos (EPA 2002b). The concentrations of asbestos found on-site were low and generally below laboratory detection levels. Since the Libby asbestos at the site is mixed with the soil, covered with vegetation, and contained on-site, the health risks associated with the contamination are likely low. Entrance restrictions on-site limit the potential for tracking contaminated soils off-site.

12. Future inhalation to on-site Libby asbestos from disturbance of contaminated soil as land use changes.

A change in land use at the former site could result in potential future exposures to Libby asbestos. Developers, construction workers, trespassers and off-site residents could be exposed if asbestos containing soils become exposed through excavation or other activities conducted on-site. The implementation of engineering controls during site development could minimize the potential for exposure.

13. Past, present and future inhalation to Libby asbestos from the handling or disturbance of asbestos-containing insulation or other products.

People who purchased and used products that contain Libby vermiculite, such as home insulation or vermiculite gardening products, may be exposed to asbestos fibers from using those products in and around their homes (EPA 2002c). Studies have shown that disturbing or using these products can result in airborne fiber levels higher than occupational safety limits (Weis 2001). Additional information for consumers of vermiculite products have been developed by the EPA, ATSDR, and NIOSH and provided to the public (see www.epa.gov/asbestos/insulation.html).

### C. Toxicological and Epidemiological Evaluation for Adult and Children Health Issues

The major health concern associated with asbestos is inhalation exposure, especially in enclosed areas. Average inhalation rates vary from 4,500 liters of air per day for infants to 17,000 L/day for adult males (EPA 1997). The respiratory system has several clearance mechanisms that control foreign particles from entering the lungs. Amphibole asbestos fibers of specific diameters, densities, lengths and aspect (length to diameter) ratios show varying success in both entering the lungs and producing a toxic response. There is general acceptance in the scientific community of correlations between asbestos toxicity and fiber length as well as fiber mineralogy. Fiber length may play an important role in clearance and mineralogy may affect both fiber persistence in the body and surface chemistry. Clearance mechanisms in the lung are highly effective for short fibers (<5µm), but become decreasingly successful with increasing fiber length (HSE 1996). In

addition, nasal cilia and other clearance mechanisms can filter larger fibers before entering the lung. For more information regarding toxicity characteristics associated with fiber size and mineralogy, see Appendix E.

Breathing any type of asbestos increases the risk of the following health effects.

Malignant mesothelioma – Cancer of the lining of the lung (pleura) and other internal organs. This cancer can spread to tissues surrounding the lungs or other organs. The great majority of mesothelioma cases are attributable to asbestos exposure (ATSDR 2001c).

Lung cancer – Cancer of the lung tissue, also known as bronchogenic carcinoma. The exact mechanism relating asbestos exposure with lung cancer is not completely understood. The combination of tobacco smoking and asbestos exposure greatly increases the risk of developing lung cancer (ATSDR 2001c).

Noncancer effects – These include asbestosis, scarring and reduced lung function caused by asbestos fibers lodged in the lung; pleural plaques, localized or diffuse areas of thickening of the pleura (lining of the lung); pleural thickening, extensive thickening of the pleura which may restrict breathing; pleural calcification, calcium deposition on pleural areas thickened from chronic inflammation and scarring; and pleural effusions, fluid buildup in the pleural space between the lungs and the chest cavity (ATSDR, 2001c).

There is not enough evidence to conclude whether inhalation of asbestos increases the risk of cancers at sites other than the lungs, pleura, and abdominal cavity (ATSDR 2001c).

Ingestion of asbestos causes little or no risk of noncancer effects. However, there is some evidence that acute oral exposure might induce precursor lesions of colon cancer and that chronic oral exposure might lead to an increased risk of gastrointestinal tumors (ATSDR 2001c).

ATSDR considers the inhalation route of exposure to be the most significant in the current evaluation of sites that received Libby vermiculite. Exposure scenarios that are protective of the inhalation route of exposure should be protective of dermal and oral exposures.

Counting fibers using regulatory definitions does not adequately describe risk of health effects, since fiber size, shape, and composition contribute collectively to risks in ways that are still being evaluated. For example, shorter fibers appear to preferentially deposit in the deep lung, but longer fibers might disproportionately increase the risk of mesothelioma (Berman et al 1999). Some of the unregulated amphibole minerals, such as winchite present in Libby asbestos, can exhibit asbestiform characteristics and contribute to risk. Fiber diameters greater than 2 µm are considered above the upper limit of respirability and do not contribute significantly to risk (Berman et al 1999).

Methods are being developed to assess the risks posed by varying types of asbestos and are currently awaiting peer review (Berman et al 1999).

Most of the information on the health effects of asbestos comes from studies of people who were exposed in the past to high levels of asbestos fibers in confined settings for long periods of time such as air in a workplace. Asbestos exposures of the magnitude and duration found in the workplace are usually not encountered by the general public in everyday life where levels of asbestos fibers in the air are much lower. A study of 512 employees at a facility that exfoliated vermiculite primarily from the Libby, Montana mine documented increased pleural changes among workers involved in vermiculite expansion (Lockey et al 1984). A recent case analysis documented a man who died as a result of exposure to asbestos-contaminated vermiculite during two consecutive summers (1951-1952) of work at a vermiculite exfoliating facility in Southern California (Wright et al 2002).

Evidence from Libby, Montana indicates that exposures much lower than workplace levels (household contacts) can lead to significant increases in disease. Exposure to asbestos resulting in asbestos related diseases in family members of asbestos industry workers have been documented (Anderson et al 1976, Kilburn et al 1985). In Libby, Montana, an elevated prevalence of pleural abnormalities was observed in the household contacts of workers employed at the mine and associated vermiculite processing facilities (ATSDR 2001b). Exposures to household employees at this site were likely.

On the basis of the information available, former employees involved with the processing and disposal of vermiculite, employee's household contacts, past occupants of the site and residents near the site could have been exposed in the past to asbestos from the Zonolite Co./ W.R. Grace facility. However, we have no reliable or precise information on the magnitude, duration and frequency of these possible past exposures, and, therefore, cannot make quantitative estimates of the health risks associated with them. The NYS DOH health statistics review will assist in evaluating if there is an increase in asbestos-related disease among people living near the site.

### **D.** Community Health Concerns

During the twenty-six year period of Zonolite Co./ W.R. Grace exfoliating operation in Brutus, there were several complaints reported to the NYS DEC from members of the local community. Community members complained of excessive dust and odor releases and inquired about the health affects associated with exposure to these emissions.

The EPA's soil sampling event in June 2001 stimulated a few inquiries from nearby property owners. However, the NYS DOH, NYS DEC, EPA, ATSDR, and Cayuga County Department of Health have not received any recent phone calls or letters from the public concerning asbestos exposure associated with the site.

### E. Child Health Considerations

ATSDR and the NYS DOH recognize that infants and children might be more vulnerable to exposures than adults in communities faced with environmental contamination. Because children depend completely on adults for risk identification and management decisions, ATSDR and the NYS DOH is committed to evaluating their special interests at the site.

The effects of asbestos on children are thought to be similar to adults. However, children may be especially vulnerable to asbestos exposures for the following reasons:

- Children are more likely to disturb fiber-laden soils or indoor dust while playing;
- Children are closer to the ground and thus more likely to breathe contaminated soils or dust;
- Exposed children could be more at risk of developing asbestos-related disease than people exposed later in life because of the long latency period between exposure and onset of asbestos-related disease. Adults, more advanced in age, have less chance of living long enough for asbestos-related illnesses to develop.

The most at-risk children are those who were household contacts of former workers while the facility was operating. Past exposures related to potential waste piles on-site, plant emissions, and stoner rock used in the yard are all pathways whose exposures cannot be quantified due to the lack of site-specific information.

Current exposures to on-site soils are of no apparent public health hazard to children because of limited on-site soil contamination and on-site soil containment through vegetative cover and fencing.

### **CONCLUSION**

From 1963-1989, Zonolite Co./ W.R. Grace Corporation exfoliated vermiculite in Brutus, New York. The plant received and processed approximately 148,485 tons of vermiculite concentrate from the W.R. Grace mine in Libby, Montana. The vermiculite contained Libby asbestos.

Evidence suggests that former Zonolite Co./ W.R. Grace employees at the Weedsport exfoliating plant were exposed to Libby asbestos. There are no documented non-occupational exposures within the community to Libby asbestos. Nevertheless, there is evidence that during its operation the facility emitted considerable quantities of dust. Moreover, this dust likely contained Libby asbestos when the plant was processing vermiculite concentrate originating from the W.R. Grace mine in Libby. The completed and potential exposure pathways to Libby asbestos and the associated public health hazards are summarized below:

### **Occupational**

- 1. Former workers employed at the Weedsport facility were likely exposed to hazardous levels of Libby asbestos as a result of working in and around the facility during active exfoliation of Libby vermiculite. Occupational exposure was a *public health hazard* in the past.
- 2. Employees at the landfills that worked directly with stoner rock and other waste material were likely exposed to Libby asbestos. However, the frequency and duration of waste handling and disposal operations are unknown. Past exposure to Libby asbestos for landfill workers was an *indeterminate public health hazard*.
- 3. Employees of the former mulch company may have been exposed to low levels of Libby asbestos. Data from indoor air samples collected after W.R. Grace terminated operations did not detect airborne asbestos. If residual levels of asbestos existed, they were likely low and posed *no apparent public health hazard*.

### Household Contacts

- 4. Household contacts of former Zonolite Co./ W.R. Grace workers were likely exposed to Libby asbestos from contamination brought home on the skin, clothing, and hair of workers. Past household contact exposure was likely a *public health hazard*. Data are insufficient to estimate exposure levels.
- 5. Landfill employee's household contacts may have been exposed to Libby asbestos. However, employees contact with the waste was likely infrequent and household contact exposure to Libby asbestos was likely even less. Past household contact exposure likely posed *no apparent public health hazard*.
- 6. Household contacts of the employees of the former mulching company were not likely exposed to significant levels of Libby asbestos, thus posing *no apparent public health hazard*.

### **Community**

- 7. The community immediately surrounding the facility was likely exposed to Libby asbestos from dust emissions associated with the site. Past community exposure to Libby asbestos emissions was an *indeterminate public health hazard* as there are insufficient data to assess exposure levels. Results from the health statistics review may provide data to further assess this indeterminate hazard. If more information becomes available in the future regarding this pathway, the hazard may be reclassified.
- 8. Occupants of the private properties that contain vermiculite waste may have been exposed to Libby asbestos in the past. The likelihood of exposures depended on the handling duration, leveling practices and the concentration of asbestos in the waste. Past exposure present an *indeterminate public health hazard*, as data are insufficient to assess exposure. As sample results become available, this pathway will be re-evaluated and may be re-classified. Current occupants of the properties are not likely exposed to Libby asbestos, since the waste is isolated and generally covered. Current exposure to Libby

asbestos associated with this waste is likely to pose no apparent public health hazard.

- 9. In the past, individuals from the community may have been exposed to Libby asbestos if they worked or played in waste piles of stoner material on-site. Contact with the material was likely infrequent. There are insufficient data concerning the use and accessibility of on-site waste materials to assess exposure. Past exposure to Libby asbestos through this pathway likely pose *no apparent public health hazard*. If more information becomes available regarding this pathway, the hazard may be reclassified.
- 10. Individuals residing near the landfills that received waste from the Weedsport facility may have been exposed to Libby asbestos if contaminated dust migrated off-site during operations. While no data are available to assess this potential exposure pathway, significant exposures were not likely, posing *no apparent health hazard*.
- 11. Individuals residing near the site and occupants of the site including former employees and trespassers may have been exposed to Libby asbestos present in on-site soil. Based on the results from on-site soil sampling, this potential past and present pathway poses *no apparent public health hazard*. The site currently does not present health risks to the surrounding community.
- 12. Future exposures to Libby asbestos in on-site soil are unlikely unless land use changes on-site. If future land use changes disturb on-site soil, public exposure to Libby asbestos is possible. It is necessary to notify future developers or site occupants of asbestos contamination so appropriate engineering controls can be implemented to minimize exposure and protect public health.

### Consumer Products

13. Consumer exposure to asbestos through the use of products that contain Libby asbestos is not evaluated within the scope of this project. Additional information for consumers of vermiculite products has been developed by EPA, ATSDR, and NIOSH and provided to the public (see <a href="https://www.epa.gov/asbestos/insulation.html">www.epa.gov/asbestos/insulation.html</a>).

### RECOMMENDATIONS

The NYS DOH and ATSDR recommend that measures be taken to identify individuals that were likely exposed to Libby asbestos and to prevent or reduce the potential for future human exposure.

1. The NYS DOH in conjunction with the Cayuga County Department of Health should contact former employees of the Zonolite Co./W.R. Grace Weedsport facility to encourage them and their household contacts to consult an occupational medicine physician for a health evaluation if they believe they were exposed to Libby asbestos. Occupational medicine physicians are doctors with experience in the diagnosis and treatment of work-related illnesses. For more information or to find an occupational

medicine clinic, visit the Association of Occupational and Environmental Health Clinic (AOEC) website at <a href="http://www.aoec.org">http://www.aoec.org</a>, or call 1-888-347-AOEC (2632).

- 2. If land use changes near the three areas containing >1% asbestos, sufficient engineering controls should be provided to mitigate any possible exposure to workers and future occupants of the site.
- 3. Limited investigation should be conducted prior to land use changes or development at the neighboring wooded property, currently owned by Weedsport Associates LLC, northeast of the site, to ensure that stoner material was not disposed on this property.
- 4. The NYS DOH should review site-specific information as it becomes available and use emerging information to evaluate indeterminate exposure pathways as applicable.
- 5. The NYS DOH should provide educational materials and references upon request to community members concerned about products containing vermiculite.

### PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan for the site contains a description of actions that have been or will be taken by ATSDR, NYS DOH and/or other government agencies at the site. The purpose of the public health action plan is to ensure that this health consultation not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR and NYS DOH to follow-up on this plan to ensure its implementation.

### Actions Ongoing

- o NYS DOH will conduct follow-up activities as outlined in the recommendations, including the completion of the health statistics review.
- O ATSDR will combine the findings from this health consultation with findings from other sites that received Libby vermiculite to create a comprehensive report outlining overall conclusions and strategies for addressing public health implications.
- o ATSDR staff are researching unpublished information within the EPA database of W.R. Grace documents (estimated 3 million pages of information relating to Libby, Montana, and other vermiculite processing sites nationwide).

### Actions Planned

The NYS DOH in conjunction with the Cayuga County Department of Health will attempt to contact former employees of the Zonolite Co./W.R. Grace Weedsport facility to encourage them and their household contacts to consult an occupational medicine physician for a health evaluation if they believe they were exposed to Libby asbestos.

- ATSDR, in cooperation with state partners and other federal agencies, is researching and determining the feasibility of conducting worker and household contact follow-up activities.
- NYS DOH will provide educational materials and references upon request to community members concerned with products containing vermiculite. Additional information for consumers of vermiculite products has been developed by EPA, ATSDR, and NIOSH and provided to the public (see <a href="https://www.epa.gov/asbestos/insulation.html">www.epa.gov/asbestos/insulation.html</a>).
- NYS DOH will review analytical results from the soil sample collected from the two private properties in Port Byron containing vermiculite waste. The results will be used to guide future decisions regarding the properties.
- O NYS DOH and ATSDR will review new information as it becomes available to determine appropriate site-specific public health actions
- o ATSDR will release annual reports summarizing health statistics review findings for selected sites for which data have been received.

### PUBLIC COMMENT DRAFT

### **CERTIFICATION**

To be added when document is finalized

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